20-4-26/52

The Oxidation of Cumene by Molecular Oxygen in Emulsions in
the Presence of Various Emulsifiers.

The acqueous phase is the essential kinetic factor in the
oxidation of hydrocarbons in the emulsions, since it acts as
initiation zone of the process and the hydroperoxides are pro-
duced in it. The importance of the acqueous phase for the
emulsionlike oxidation still increases substantially in the
presence of colloidal electrolytes (emulsifiers) containing a
surface-active anion. The emulsifiers accelerate the pro-
duction of the hydroperoxides at otherwise equal conditions.
In the emulsionlike oxidation of the hydro-carbons the
initiation of the reaction and the production of hydroper-
oxide occur mainly in the acqueous phase. The primary initiation
of the processes discussed here consists in the production of
free hydrocarbon-radicals. Besides the specific influence of
the emulsifier on the decay of hydroperoxide of cumene the
solubility of the hydroperoxide in the acqueous phase connect-
ed with this process must also be taken into account. There
are 2 figures, 1 table, and 6 references, 3 of which are
Slavic.

ASSOCIATION: State University imeni Iv. Franko, L'vov (L'vovskiy
               gosudarstvennyy universitet imeni Iv. Franko).

Card 2/3

The Oxidation of Cumene by Molecular Oxygen in Emulsions in   20-4-26/52
• ·the Presence of Various Emulsifiers.

. PRESENTED: May, 21, 1957, by P. A. Rebinder, Academician.

SUBMITTED: May 3, 1956

AVAILABLE: Library of Congress

Card 3/3

KUCHER, R.V.; YENAL'YEV, V.D. [IEnal'iev, V.D.]; YURZHENKO, A.I.,
[Yurzhenko, O.I.], Kovbuz, M.O.

Effect of the molecular weight of tertiary hydrocarbons on
their oxidizability in the liquid phase and in emulsions. Nauk.
zap.L'viv.un. 46:13-16   '58.
                  (Hydrocarbons) (Oxidation)   (MIRA 12:7)

KUCHER, R.V.; YURZHENKO, A.I. [IUrzhenko, O.I.]; KOVBUZ, M.O.

Means of accelerating the oxidation reaction of isopropylbenzene
in the liquid phase. Nauk.zap.L'viv.un. 46:17-20 '58.
(MIRA 12:7)

(Cumene) (Oxidation)

YURZHENKO, A. I. and KUCHER, P. V.

"Some Peculiarities in the Course of Chain Reactions in Hydrocarbon Emulsions Sta-
bilized by Surface-active Emulsifiers."

report presented at the Section on Colloid Chemistry, VIII Mendeleyev Conference of
General and Applied Chemistry, Moscow, 16-23 March 1959.
(Koll. Zhur. v. 21, No. 4, pp. 509-511)

SOV/21-59-1-16/26

5(2)

AUTHORS: Kucher, R.V., Storozh, G.F., and Yurzhenko, A.I.

TITLE: The Viscosity of Water Solutions of Sodium Oleate in the Presence of Some Alcohols. (Vyazkost' voanykh rastvorov oleata natriya v prisutstvii nekotorykh spirtov).

PERIODICAL: Dopovidi Akademii nauk Ukrains'koi RSR, 1959, Nr 1, pp 60-63 (USSR)

ABSTRACT: The water solutions of soaps are usually character- ized by means of the so-called first and second critical concentrations of the formation of micelles. It was proved in the described experiment, that apart from the critical micelles concentrations CMC-1 and CMC-2, there exists one intermediate concentration which can be quite accurately determined from the mini- mum of the concentration curves of a given specific viscosity. Small quantities of alcohols (ethyl,

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SOV/21-59-1-16/26

The Viscosity of Water Solutions of Sodium Oleate in The Presence of Some Alcohols.

n-butyl, isoamyl, ethylen-glycol and glycerine) in solution lowered the middle critical concentration, and larger quantities raised it. Experiments have confirmed the theoretical data contained in the referred literature , and, therefore, the authors recommend it for guidance. There are 3 graphs and 9 references, 2 of which are Soviet, 2 German, 1 Scandinavian, 2 Japanese, and 2 American.

ASSOCIATION: L'vovskiy gosudarstvennyy universitet im Iv.Franko (The L'vov State University imeni Ivan Franko)

PRESENTED: July 19, 1958, by A.V. Dumanskiy, Member of the AS UkrSSR

Card 2/2

SOV/69-21-3-12/25

5(4)

AUTHORS: Kucher, R.V., Yurzhenko, A.I., Kovbuz, M.A.

TITLE: Some Emulsifiers as Kinetic Factors of Cumene Oxidation in Emulsions

PERIODICAL: Kolloidnyy zhurnal, 1959, Vol XXI, Nr 3, pp 309-314 (USSR)

ABSTRACT: The authors report on the effect of a number of emulsifiers (potassium palmitate, Nekal, Leucanol and cetyl pyridine bromide) on the kinetics of oxidation of cumene (isopropylbenzene)(IPB) and on the yield of hydroperoxides (HPC). The maximum rate of oxydation of IPB in emulsion and the maximum yield (70-80%) of HPC were obtained with a 0.5-1% potassium palmitate concentration. Nekal and Leucanol also speed up the accumulation of HPC ($\sim$70%), but this process is delayed by a certain period of induction. The effect of Nekal, like that of other colloidal electrolytes, is connected to a considerable extent with the change of the rate

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Some Emulsifiers as Kinetic Factors of Cumene Oxidation in
Emulsions

SOV/69-21-3-12/25

of decomposition of HPC in the presence of these sub-
stances. The effect of the emulsifiers on the rate
of oxidation of IPB depends in the main on their col-
loidal properties (micelle formation, colloid solubili-
ty). The cation active emulsifier cetyl pyridine bro-
mide, if introduced into the initial oxidation mixture,
noticeably delays the process of HPC accumulation.
The introduction of 0.1% cetyl pyridine bromide 30
hours after the initiation of the process stimulates
the reaction. In this case, the yield of HPC reaches
nearly 80%. The authors mention the Soviet scientists
K.I. Ivanov and N.M. Emanuel'. There are 5 graphs, 2
tables and 11 references, 8 of which are Soviet and 3
English.

ASSOCIATION: L'vovskiy universitet (L'vov University)

SUBMITTED: 14 September, 1957

Card 2/2

SOV/76-33-2-30/45

5(4)
AUTHORS: Kucher, R. V., Kovbuz, M. A.

TITLE: On the Role of the Aqueous Phase in the Emulsion Oxidation of Isopropyl Benzene (O roli vodnoy fazy v protsesse emul'sionnogo okisleniya izopropilbenzola)

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 2, pp 429 - 436 (USSR)

ABSTRACT: The oxidation of isopropyl benzene (cumene) (I) is a very important reaction for industry, since the main product is hydrogen peroxide (II), which is needed for the production of phenol and acetone (Ref 1). In order to increase the yield of (II) in the case of emulsion oxidations of hydrocarbons it must be possible to estimate the macroscopic reaction stages and their reproducibility. Results concerning such tests are given in this paper. The oxidations were carried out in emulsions which were not stabilized by emulsifiers, and at definite time intervals samples were tested for their (II) content using a potentiometric titra-

Card 1/3

On the Role of the Aqueous Phase in the Emulsion Oxidation of Isopropyl Benzene

SOV/76-33-2-30/45

tion involving the iodometric micro-method (Ref 2). The experiments dealt only with neutral and alkaline aqueous phases. The experimental results show (Fig 1) that by varying the alkalinity of the aqueous phase the process is considerably accelerated and the induction period is reduced. By using a 0.1 n soda solution (pH = 9.9) the induction period decreased to almost zero and the rate of reaction (RR) became 1.5 times greater than in the homogeneous phase. The (RR) also increases with an increase in the relative content of the aqueous phase in the emulsion. A reapplication of the aqueous phase does not inhibit the "new" reaction, and even seems to cause the reaction to run better than with a "fresh" aqueous phase (Fig 3). The removal of the aqueous phase from a reaction which has already begun hinders the reaction, decreases the yield of (II), and can in certain cases even lead to the decomposition of the (II) produced. The experimental results (Fig 5) show that not only does the addition of a soda solution during the reaction "renew" the reaction, but it will cause a reaction which has already run to react further

Card 2/3

On the Role of the Aqueous Phase in the Emulsion
Oxidation of Isopropyl Benzene

SOV/76-33-2-30/43

and thus increase the yield of (II). In relation to the
topochemical scheme for the emulsion oxidations of hydro-
carbons (Ref 7) it is assumed that the production and deve-
lopment of the molecular chains takes place in the aqueous
phase, while the hydrocarbon phase functions as a "reservoir"
for (II). The idea of a division of the macroscopic stages
of the process according to phases agrees well with the
theory of N. M. Emanuel'. There are 5 figures and 10 refer-
ences, 6 of which are Soviet.

ASSOCIATION: L'vovskiy gosudarstvennyy universitet im. I. Franko (L'vov
               State University imeni I. Franko)

SUBMITTED: July 19, 1957

Card 3/3

5(4)   SOV/76-33-3-18/41
AUTHOR: Kucher, R. V.

TITLE: The Effect of Cobalt Stearate and of Ozone in the Liquid
               Phase- and Emulsion Oxidation of Cumene (Deystviye stearata
               kobal'ta i ozona pri zhidkofaznom i emul'sionnom okislenii
               kumola)

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 3,
               pp 617 - 626 (USSR)

ABSTRACT: The production of phenol and acetone by the decomposition of
               hydrogen peroxide of isopropylbenzene is at present one of
               the most important processes in chemical industry (Ref 1).
               This is the reason for the detailed investigation of the
               effect of various catalysts upon the oxidation reaction of
               cumene (I) (Refs 2-7, 9-10). As the hydrocarbon oxidation is
               at milder temperature conditions of particular interest as
               well as an increase in the yield in peroxide compounds, these
               phenomena were investigated in connection with the work under
               review. The effect of bivalent and trivalent cobalt stearate
               (II) upon the oxidation rate of (I) was investigated at
Card 1/3   temperatures below 100° and apart from this a reaction sti-

The Effect of Cobalt Stearate and of Ozone in the Liquid   SOV/76-33-3-18/41
Phase- and Emulsion Oxidation of Cumene

mulation was attempted with gaseous ozone (III). The hydro-
gen peroxide formed (IV) was iodometrically-potentiometri-
cally determined in the samples during the experiments (Ref 12),
as well as the carbonyl compounds and acids (Ref 13). In the
case of an addition of 0.015% by mole, bivalent (II) causes
a maximum acceleration of the formation of (IV) (Fig 2). An
increase in the added quantity of bivalent (II) promotes the
formation of acid and CO_2 (Fig 3). Additions of lye- and soda
solutions led to an increased decomposition of (IV) which
had a weaker effect in the case of the presence of trivalent
(II) than in the case of bivalent (II). A rise of temperature
brings about an increase in the (IV)-yield. An addition of
benzoin accelerates the formation of (IV) and increases the
yield, which fact is considered to be due to the redox re-
action between (II) and benzoin and the formation of free ra-
dicals. The yield in (IV) is higher in the case of emulsion
oxidations than with oxidations of (I) in homogeneous liquid
phase. Initiating the cumene oxidation in the initial stage
of the process by (III) showed that an acceleration can only
be attained in the case of additions in certain amounts and

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The Effect of Cobalt Stearate and of Ozone in the Liquid SOV/76-33-3-18/41
Phase- and Emulsion Oxidation of Cumene

at a certain duration (3 minutes) of the process. Additions
of ozone during the process of reaction exert also a favorable
effect. They have, however, no effect on the emulsion-
oxidation (Fig 7). In conclusion S. D. Kuz'min is thanked.
There are 8 figures and 15 references, 12 of which are Soviet.

ASSOCIATION: L'vovskiy gosudarstvennyy universitet im. I. Franko (L'vov
State University imeni I. Franko)

SUBMITTED: July 19, 1957

Card 3/3

S/021/60/000/006/015/019
A153/A029

AUTHORS: Kucher, R.V.; Kaz'min, S.D.

TITLE: On Thermal Decomposition of Cumene Hydroperoxides in Solubilized
             Aqueous Solutions

PERIODICAL: Dopovidi Akademiyi nauk Ukrayins'koyi RSR, 1960, Nr. 6, pp. 817 - 820

TEXT: Furthering a study conducted by A.Y. Yurzhenko and F.Y. Hrobshteyn
(Ref. 2) the authors investigated the effects of solubilization of cumene hydro-
peroxide upon the rate of its thermal decomposition. Cumene hydroperoxide with
a purity of 99.2% was treated in a medium of pure nitrogen in glass vials. So-
lubilization effects were also studied on vials, which for the sake of a complete
saturation were agitated with solubilized solutions during 10 - 12 hours at 20°C.
The results are as follows: the thermal stability of hydroperoxides in aqueous
solutions is determined to a great extent by their solubility in the presence of
an emulsifier. The value of cumene hydroperoxide solubilization in aqueous solu-
tions of Nekal greatly influences the rate of its thermal decomposition. The
solubility of hydroperoxide in diluted Nekal solutions (up to 2%) is decreased

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S/021/60/000/006/015/019
A153/A029

On Thermal Decomposition of Cumene Hydroperoxides in Solubilized Aqueous Solutions

if its micelles are previously saturated with isopropylbenzene. It is possible to compute the constants of the hydroperoxide thermal decomposition rate in an aqueous Nekal solution from the data of hydroperoxide solubilization. The computed values of the constants are in good agreement with the values found empirically and show that the general picture of solubilization undergoes but insignificant changes with the changes in temperature. There are: 1 figure, 1 table and 6 references: 3 Soviet, 1 German and 2 English.

ASSOCIATION: L'vivs'kyy derzhavnyy universitet im. Iv. Franka (L'vov State University imeni Ivan Franko)

PRESENTED: by A.V. Dumans'kyy, Academician, AS UkrSSR

SUBMITTED: June 25, 1959

Card 2/2

KUCHER, R.V.; KOVBUZ, M.A.; YURZHENKO, A.I.

Decomposition of isopropylbenzene hydroperioxide during the homogeneous and emulsion oxidation of a hydrocarbon. Sbor. nauch. rab. Inst. fiz.-org. khim. AN BSSR no.8:22-31 '60.   (MIRA 14:3)

1. L'vovskiy gosudarstvennyy universitet im. I. Franko.
                (Cumene hydroperoxide)

YENAL'YEV, V.D.; KAZ'MIN, S.D.; KUCHER, R.V.

Initiation of the emulsion oxidation of isopropylbenzend and 1, 1-diphenylethane by hydrogen peroxide. Sbor. nauch. rab. Inst. fiz.-org. khim. AN BSSR no.8:126-131 '60.   (MIRA 14:3)

1. L'vovskiy gosudarstvennyy universitet im. I. Franko.
    (Cumene)   (Ethane)   (Hydrogen peroxide)

KUCHER, R.V.; KAZ'MIN, S.D.; YURZHENKO, A.I.

Some kinetic characteristics of the emulsion oxidation of hydorcarbons. Sbor. nauch. rab. Inst. fiz.-org. khim. AN BSSR no.8:132-137 '60.   (MIRA 14:3)

1. L'vovskiy gosudarstvennyy universitet im. I. Franko.
                        (Hydrocarbons)   (Oxidation)

KOVBUZ, M.A., KUCHER, R.V., BUGROVA, E.M.

Chromatographic determination of isopropylbenzene during
the process of its oxidation. Zav.lab. 26 no.7:816-817
'60.   (MIRA 13:7)

1. L'vovskiy gosudarstvennyy universitet im. Franko.
   (Benzene)   (Chromatographic analysis)

5.3300   2209   S/079/60/030/009/001/015
                                               B001/B064

AUTHORS: Kucher, R. V., Yurzhenko, A. I.

TITLE: Oxidation of Butyl Benzenes and Ethyl Benzene in the Liquid
              Phase in the Presence of Alkali Lyes, Cobalt Stearate,
              and Auramine

PERIODICAL: Zhurnal obshchey khimii, 1960, Vol. 30, No. 9,
              pp. 2798-2804

TEXT: The present paper deals with the effect of caustic soda upon the
rate of accumulation of hydroperoxides formed during the oxidation of a
mixture of secondary and isobutyl benzenes, as well as of ethyl benzene
in the liquid phase. It was shown that for butyl benzenes an amount of
0.1-0.2% sodium hydroxide has the highest efficiency; as for ethyl benzene,
the optimum amount of NaOH is approximately 50%. Addition of cobalt
stearate results in a higher rate of oxidation of the above hydrocarbons,
with the highest possible concentration of the hydroperoxides, however,
being reduced; this is mainly due to intensified decomposition of the
hydroperoxides in the presence of cobalt stearate. The oxidation of ethyl

Card 1/2

Oxidation of Butyl Benzenes and Ethyl Benzene 3/079/60/030/009/001/015
in the Liquid Phase in the Presence of Alkali B001/B064
Lyes, Cobalt Stearate, and Auramine

benzene and butyl benzenes is accelerated by a slight addition of auramine,
the highest possible concentration of hydroperoxides thus being reduced.
The authors thank L. A. Baranovskiy for his assistance in experimenting,
and mention papers by K. I. Ivanov (Ref. 3) and N. M. Emanuel' (Refs. 6-8).
There are 6 figures, 1 table, and 16 references: 13 Soviet, 1 German,
and 2 US.

ASSOCIATION: L'vovskiy gosudarstvennyy universitet
               (L'vov State University)

SUBMITTED: May 11, 1959

Card 2/2

81410

S/020/60/132/06/35/068
B004/B005

5.3200

AUTHORS: Kucher, R. V., Kaz'min, S. D., Yenal'yev, V. D.

TITLE: On the Possibility of Increasing the Yield in Hydroperoxide
               by Initiating the Cumene Oxidation With Hydrogen Peroxide

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 132, No. 6,
               pp. 1348-1351

TEXT: The authors discuss the process of initiation of a chain reaction
on the basis of papers by N. M. Emanuel' (Ref. 1) and N. N. Semenov (Ref.2).
In previous papers by the authors (Refs. 3, 4) it was observed that in
the case of initiation of oxidation of isopropyl benzene by means of
H_2O_2 the effect depends on the point of time of adding the initiator
(Fig. 1A). An addition at the beginning of oxidation effects neither
acceleration of the reaction nor reduction of the induction period.
Only if H_2O_2 is added at later points of time when the reaction becomes
slower, it effects an acceleration so that the hydroperoxide yield rises

Card 1/3

81410

On the Possibility of Increasing the Yield   S/020/60/132/06/35/068
in Hydroperoxide by Initiating the Cumene   B004/B005
Oxidation With Hydrogen Peroxide

from 40 to 80%. Hence, the authors conclude that the by-products develop-
ing during oxidation exert an inhibiting influence which is eliminated
by H_2O_2. They confirmed this conclusion by adding phenol as an inhibitor
the effect of which was really eliminated by H_2O_2 (Fig. 1B). Equations
are written down for the kinetics of the reaction $A \rightarrow B \rightarrow C$, with the
product B undergoing degenerated branching, and C interrupting the reaction
chain; Fig. 2 shows the function $\eta = f(\tau)$ for various values of β
($\eta = B/A$, $\tau = A\sqrt{h/g}$, h = rate constant of degenerated branching, g = rate
constant of the interruption of reaction, $\beta = k_3\sqrt{A/hg}$, k_3 = constant of
the reaction rate for C). The later the H_2O_2 is added, the more intensive
is its initiating effect. There are 2 figures and 6 references: 5 Soviet
and 1 Swedish.

ASSOCIATION: L'vovskiy gosudarstvennyy universitet im. Ivana Franko
               (L'vov State University imeni Ivan Franko)

Card 2/3

81410

On the Possibility of Increasing the Yield   S/020/60/132/06/35/068
in Hydroperoxide by Initiating the Cumene   B004/B005
Oxidation With Hydrogen Peroxide

X

PRESENTED: February 11, 1960, by V. N. Kondrat'yev, Academician

SUBMITTED: February 9, 1960

Card 3/3

KUCHER, R.V.; KAZ'MIN, S.D.

Emulsion oxidation of alkyl aromatic hydrocarbons under pressure.
Part 1: Kinetic laws governing the accumulation of the main
products during the oxidation of isopropylbenzene and 1,1-dip-
henylethane. Kin. i kat 2 no.2:263-266 Mr-Ap '61.   (MIRA 14:6)

1. L'vovskiy gosudarstvennyy universitet i Ukrainskiy nauchno-
issledovatel'skiy institut poligraficheskoy promyshlennosti.
                    (Cumene) (Ethane)

KUCHER, R.V.; KAZ'MIN, S.D.; KOVBUZ, M.A.

Characteristics of salt catalysis during oxidation of alkyl
aromatic hydrocarbons. Izv.vys.ucheb.zav.; khim.i khim.tekh. 4
no.6:971-976 '61.   (MIRA 15:3)

1. L'vovskiy gosudarstvennyy universitet imeni Franko, kafedra
fizicheskoy i kolloidnoy khimii.
    (Salts)   (Catalysis) (Oxidation)   (Hydrocarbons)

KUCHER, R.V.; KOVBUZ, M.A.; KAZ'MIN, S.D.

Alkaline oxidation of isopropylbenzene. Ukr.khim.zhur. 27
no.5:658-663 '61.   (MIRA 14:9)

1. L'vovskiy gosudarstvennyy universitet im. I. Franko.
            (Cumene)   (Oxidation)

KUCHER, R.V.; KOVBUZ, M.A.; TEODOROVICH, M.Ye.

Chromatographic separation of meta-diisopropylbenzene hydroperoxides.
Zav.lab. 27 no.11:1331-1333 '61.   (MIRA 14:10)

1. L'vovskiy gosudarstvennyy universitet imeni I.Franko.
        (Benzene)   (Hydroperoxide)
            (Chromatographic analysis)

KAZ'MIN, S.D.; KUCHER, R.V.

Activation energy of chain propagation during the oxidation of
isopropylbenzene and 1, 1-diphenylethane. Zhur.ob.khim. 31
no.10:3171-3174 O '61.   (MIRA 14:10)

1. Ukrainskiy nauchno-issledovatel'skiy institut poligraficheskoy
promyshlennosti.
                    (Cumene)   (Ethane)   (Oxidation)

S/080/61/034/003/009/017
A057/A129

AUTHORS: Kucher, R. V., Kovbuz, M. A., Teodorovich, M. Ye.

TITLE: On the purification of isopropylbenzene by adsorption

PERIODICAL: Zhurnal prikladnoy khimii, v. 34, no. 3, 1961, 598 - 603

TEXT: A method for the purification of isopropylbenzene by means of adsorption was developed to improve the oxidizability of the latter in liquid phase autocatalytic oxidation processes. These processes are very sensitive, especially at the beginning of the reaction, to the presence of impurities in the hydrocarbon. Usually an acid-alkali purification is applied, eventually with subsequent boiling over sodium metal, as recommended by D. D. Grant and C. F. Tipper [Ref. 4: J. Chem. Soc., 640 (1955)]. But also several adsorption methods were suggested in order to remove impurities from hydrocarbons, as isopropylbenzene or others by O. A. Kolmakov et al. [Ref. 9: Tr. po khim. i khim. tekhn., Gor'kiy, 1, 36 (1958)] or N. D. Kazakova and V. G. Gutsalyuk [Ref. 10: Izv. AN KazSSR, ser. khim., 1, 99 (1958)] and also in the Canadian patent 509870. Thus in the present work the adsorption was investigated of some substances dissolved in isopropylbenzene on ACK (ASK), ACM (ASM) silica gel, aluminum oxide "for chromatography" and two types of carbon

Card 1/6

On the purification of isopropylbenzene by adsorption

black (from Dasha and Ufa). Also the oxidation rate of isopropylbenzene after pu-
rification was estimated. The adsorption of the impurities - thiophene, styrene,
phenol, acetophenone and dimethylphenylcarbinol - from isopropylbenzene was studied
by the dynamic method. The amount of the non-adsorbed impurity was determined by
means of an ИТР-2 (ITR-2) nephelometer. Activation of the silica gel was carried
out in the usual way by gradual drying at 40, 60, 80 and 110°C according to E. Kh.
Iskhakova et al. [Tr. Inst. nefti AN SSSR, 12, 35 (1958)]. The experiments on ad-
sorption of a non-saturated compound (styrene) showed highest adsorption on carbon
black. Because of the easier handling, granulated carbon black was used in the
further experiments (see tabulated data). Aluminum oxide showed a low adsorption
capacity related to non-saturated compounds (styrene) and also for oxygen-contain-
ing compounds (acetophenone, dimethylphenylcarbinol). Therefore aluminum oxide was
no more investigated. ASM silical gel had a high adsorption capacity for all in-
vestigated impurities, but it adsorbs also isopropylbenzene, while ASK silica gel
does not adsorb the latter, but shows low adsorption capacity for styrene. Conse-
quently a mixture (2 : 1 by weight) of ASK silica gel and granulated carbon black
was tested with isopropylbenzene containing: 0.01% styrene, 0.01% dimethylphenyl-
carbinol, 0.01% phenol and 0.01% acetophenone. The obtained results were compared

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On the purification of isopropylbenzene by adsorption

S/080/61/034/003/009/017
A057/A129

with values obtained on pure ASM silica gel, consecutive adsorption of granulated carbon black on ASK and ASM silica gel, and the mixture 2 : 1. It can be seen from Fig. 3 that best results were obtained with ASK-carbon black mixture. Hence the latter is the optimum adsorbent for the purification of technical grade iso-propylbenzene. Regeneration of the silica gel is carried out by washing with boiling water or steam and subsequent calcination. Kinetic curves (Fig. 4) on accumu-lation of hydrogen peroxide in liquid-phase homogeneous oxidation of isopropyl-benzene obtained after purification by the acid-alkali method show that a lower reaction capacity is obtained in comparison to the product purified by adsorption methods. 5 kg of ASK silica gel and 2.5 kg of carbon black are necessary for the purification of 100 l of isopropylbenzene. There are 5 figures, 1 table and 12 references: 11 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: D. D. Grant, C. F. Tipper, J. Chem. Soc., 640 (1955).

ASSOCIATION: Kafedra fizicheskoy i kolloidnoy khimii L'vovskogo gosudarstvennogo universiteta imeni I. Franko (Department of Physical and Colloid Chemistry of the L'vov State University imeni I. Franko)

SUBMITTED: May 18, 196

Card 3/6

KUCHER, R.V.; SOROKA, V.A.

Decomposition of isopropylbenzene hydroperoxide on adsorbents, Zhur.
prikl.khim. 34 no.7:1573-1577 Jl '61.   (MIRA 14:7)

1. L'vovskiy gosudarstvennyy universitet imeni I.Franko.
          (Cumene)   (Adsorbents)

28291
S/076/61/035/010/010/015
B106/B230

54300 *also 1375*

AUTHORS: Kucher, R. V., Kaz'min, S. D., and Yenal'yev, V. D.

TITLE: Initiation of emulsion oxidation of alkylated aromatic hydrocarbons by hydrogen peroxide

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 10, 1961, 2322 - 2327

TEXT: The authors investigated the initiation by hydrogen peroxide in emulsion oxidation of isopropyl benzene, 1,1 diphenyl ethane, and 1-phenyl-1-p-tolyl ethane in the liquid phase, this problem being of great practical interest in the synthesis of hydroperoxide compounds. Oxidation was conducted at 85°C in "air lift" type glass vessels in which the re- action mixture was agitated by air bubbling in through a porous glass partition. For the aqueous phase, a 0.1 N soda solution was used in all tests. The volume ratio of the hydrocarbon phase to the aqueous phase was 1:3. At regular intervals, samples were taken and the hydroperoxide content was determined iodometrically by potentiometric titration (Ref. 5; see below). Oxidation of the alkylated aromatic hydrocarbons referred to proceeds in emulsion systems by autocatalysis. The effect of hydrogen

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28291
S/076/61/035/010/010/015
B106/B230

Initiation of emulsion oxidation of ...

peroxide on the process is very specific, and depends not merely on the character of the hydrocarbon but also, in a high degree, on the instant of adding the hydrogen peroxide. Constant initiation by adding hydrogen peroxide at short intervals intensifies the oxidation of 1,1-diphenyl ethane, whereas it inhibits the oxidation of cumene. In all oxidation processes investigated, the following common rules could be observed: when hydrogen peroxide was added at the beginning of the process, re- action rate and hydroperoxide yield were practically not affected; when, however, hydrogen peroxide was added at the final stage of oxidation after maximum concentration of hydroperoxide was attained, a rapid rise in re- action rate and hydroperoxide yield took place anew. From observations made the following conclusions were drawn: Initiation by hydrogen peroxide did not simply cause a rise in the concentration of chain radi- cals as had been frequently assumed in publications. Apparently, radi- cals formed by decomposition of H_2O_2 were not sufficiently active to start new chains by reacting with the hydrocarbon. With progressing oxidation, products accumulated in the system acting as inhibitors on oxidation. With such inhibitors initiator radicals may react, thus eliminating the inhibiting effect. For this reason, initiation effect increases with

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S/076/61/035/010/010/015

Initiation of emulsion oxidation of ...   B106/B230

progressing reaction. This hypothesis was confirmed by an experiment in which hydrogen peroxide was introduced into a reaction retarded by an inhibitor. For this purpose, the oxidation of cumene was inhibited by adding a small quantity (0.01 g-mole/liter) of phenol breaking down the oxidation chains according to reaction $C_6H_5OH + R^{\cdot} \longrightarrow C_6H_5O^{\cdot} + RH$. The $C_6H_5O^{\cdot}$ radicals are of low activity, and recombine. Adding hydrogen peroxide eliminated the inhibition of the reaction, and caused a steep rise of the oxidation rate. When during the reaction, oxidation products combine with initiator radicals to form radicals similar to chain radicals in their activity, initiation results in increasing the total oxidation rate. In the reverse case, the consumption of components reacting with initiator radicals is accelerated and the total reaction rate decreases. Also in this case, the effect of a brief initiation at the final stage of oxidation may be favorable for the process. The effect of an initiator therefore depends on the reactivity of the components of the reaction mixture. There are 3 figures and 7 references: 5 Soviet and 2 non-Soviet. The two references to English-language publications read as follows: Ref. 5: V. Kokatnur, M. Jelling, J. Amer. Chem. Soc., 63,

Card 3/4

Initiation of emulsion oxidation of ...

28291
S/076/61/035/010/010/015
B106/B230

1432, 1941; J. W. Fordham, H. L. Williams, Canad. J. Chem., 27B, 913, 1954.

ASSOCIATION: L'vovskiy universitet im. Iv. Franko (L'vov University imeni
                Iv. Franko)

SUBMITTED: March 3, 1960

Card 4/4

KUCHER, R.V.; KAZ'MIN, S.D.

Mechanism of the formation of carbonyl compounds and acids in emulsion oxidation of isopropylbenzene. Dokl. AN SSSR 139 no.5:1114-1116 Ag '61. (MIRA 14:8)

1. L'vovskiy gosudarstvernyy universitet im. Iv. Franko. Predstavleno akademikom V.N. Kondrat'yevym.
(Carbonyl compounds) (Cumene)

KUCHER, R.V.; KAZ'MIN, S.D.

Emulsion oxidation of alkyl aromatic hydrocarbons under pressure.
Part 3: Effect of hydrogen peroxide on the reaction of oxidation
of isopropylbenzene and 1,1-diphenylethane. Kin.i kat. 3 no.1:
31-35 '62.   (MIRA 15:3)

1. L'vovskiy gosudarstvennyy universitet imeni Franko.
            (Cumene) (Ethane) (Hydrogen peroxide)

KUCHER, R.V.; KOVBUZ, M.A.; BUGROVA, E.M.; VASIL'KEVICH, I.M.

Liquid phase oxidation of isopropylbenzene at high pressure. Zhur. prikl.khim. 35 no.1:170-176 Ja '62.   (MIRA 15:1)

1. L'vovskiy gosudarstvennyy universitet imeni I.Franko.
            (Cumene)   (Oxidation)

KUCHER, R.V.; RUD', R.N.

Separation of nono-, di-, and hydroperoxide of p-diisopropyl-
benzene by chromatography on silica gel. Zav.lab. 29 no.1:
19-22 '63.   (MIRA 16:2)

1. L'vovskiy gosudarstvennyy universitet imeni Ivana Franko.
        (Cumene)   (Hydroperoxide)   (Chromatographic analysis)

KAS'MIN, S.D.; KUCHER, R.V.

Role of emulsifying agents in the oxidation of isopropylbenzene
and 1, 1-diphenylmethane. Neftekhimiia 3 no.3:371-375 My-Je '63.
(MIRA 16:9)

1. L'vovskiy gosudarstvennyy universitet imeni I. Franko.
        (Ethane) (Cumene) (Emulsifying agents)

L 15473-63   EPF(c)/EWT(m)/BDS   Pr-4   RM/WW
ACCESSION NR: AP3005454   S/0204/63/003/004/0572/0578

AUTHOR: Kucher, R. V.

TITLE: Kinetic regularities of hydroperoxide accumulation during the oxidation of n-diisopropylbenzol

SOURCE: Neftekhimiya, v. 3, no. 4, 1963, 572-578

TOPIC TAGS: hydroperoxide, diisopropylbenzol, hydroperoxide accumulation, liquid phase oxidation, carbinol, tertiary carbinol, sodium carbonate

ABSTRACT: Authors analyzed the kinetics of the accumulation of mono-, di-, and oxyhydroperoxides during the liquid-phase oxidation of n-diisopropylbenzol. It was shown that the primary products of the reaction are monohydroperoxides which form dihydroperoxides when oxidized. Oxyhydroperoxides are formed either by the decomposition of dihydroperoxides, or by the oxidation of tertiary carbinols. When the process is conducted in the presence of dry sodium carbonate or in an alkaline emulsion, the yield of dihydroperoxide increases. A

Card 1/2

L 15473-63

ACCESSION NR: AP3005454

scheme for a chain process of oxidation of dialkylaromatic hydro-carbons has been proposed. This scheme is confirmed by a mathematical analysis. Orig. art. has: 1 table, 4 figures, and 32 formulas.

ASSOCIATION: L'vovskiy gosudarstvenny*y universitet im. Iv. Franko (Lvov State University)

SUBMITTED: 21Sept62   DATE ACQ: 06Sept63   ENCL: 00

SUB CODE: CH   NO REF SOV: 006   OTHER: 002

Card 2/2

CHERNYAK, B.I.; KUCHER, R.V.; NIKOLAYEVSKIY, A.N.

Liquid-phase oxidation of butene-1. Neftekhimia 4 no.3:452-457
My-Je '64.   (MIRA 18:2)

ACC NR /EWT(m) Ir-4 RM

Kucher, N. F.

Mechanism of the liquid phase oxidation of butene-1

SOURCE: Neftekhimiya, v. 4, no. 4, 1964, 576-583

TOPIC TAGS: hydrocarbon, oxidation, reaction mechanism, organic oxide, chemical mechanism, activation energy

ABSTRACT: The liquid phase oxidation of butene-1 was investigated with ... by beta naphthol. The liquid phase oxidation was ... branched chain reaction autocatalyze s ... accumulation of peroxide compounds, readily inhibiting new ... energies were calculated initiation of the process of the initial ... in the developed tra ... energy of chain propagation ... of peroxides and oxides proceeded according to a chain mechanism ... carbinol was formed by a chain mechanism ... mechanism (esterification reaction ... ketohydroperoxides. The basic reaction of the ... butene-1 during its liquid phase oxidation consisted of ... of the

Card 1/2

L 36175 55

ACCESSION NR: AP5010005

peroxy radical with the double bond of the olefin, producing an alkylalkene peroxide radical, and leading to the formation of an alphaoxide. A general ... proposed for the liquid phase oxidation of ...

ASSOCIATION: none

SUBMITTED: 05Nov65   ENCL:00   SUB CODE: IC, OC

NR REF SOV: 015   OTHER: 009   OT R.

Card 2/2

KUCHER, R.V.; CHERNYAK, B.I.

Some characteristics of the mechanism underlying a liquid-phase oxidation of butene in the presence of alkalies. Dokl. AN SSSR 160 no.4:835-846 I -65.   (MIRA 18:2)

1. Submitted July 23, 1962.

KUCHER, Sergey Ivanovich; LUZAN, Petr Konstantinovich; TSESHKOVSKIY,
F.M. [TSeshkovs'kyi, F.M.], red.; SAVCHENKO, M.S., tekhn.red.

[Seven-year plan for agriculture in action] Semyrichka po
zemlerobstvu v dii. Kyiv, Derzh.vyd-vo sil's'kohospodars'koi
lit-ry URSR, 1960. 138 p.   (MIRA 13:12)
          (Ukraine--Agriculture)

Category : USSR/Solid State Physics - Solid state theory. Geometric crystallography   E-2

Abs Jour : Ref Zhur - Fizika, No 1, 1957, No 1041

Author   : Kucher, T.I., Tolpygo, K.B.
Title   : Multi-Electron Analysis of the Motion of an Electron in a Perturbed
           Crystal

Orig Pub : Nauk. zap. Kyyivs'k. un-t, 1955, 14, No 8, 21-32

Abstract : A more detailed treatment of a previously-published work (Ref. Zhur. Fiz.,
           1956, 3862

Card   : 1/1

Kueher, T.I. — KUČER, T.I.

PA - 1881

CARD 1 / 2

For the consistent computation of the deformation of a crystal(which must
necessarily occur near the local state of the electron and must influence its
energy considerably) the multielectronic investigation of the problem must
also make it possible to take exchange forces into consideration. Therefore
the problem must be based on the antisymmetric function of the crystal, i.e.
on FOK'S approximation. It is to this generalization that the present work is
devoted.

The basic simplifying conditions: A binary cubic ion crystal with a vacant
node is investigated in the origin of coordinates. Let it be assumed that in
the crystal there is a surplus electron (hole) if a negative (positive) ion
is removed. The function of the crystal is chosen in form of a linear combi-
nation of the antisymmetric products Ψ_s^1 of the wave functions of the individ-
ual ions. The electron is assumed to move along the positive, and the hole
along the negative ions. The influence exercised by the position of the
electron (hole) on the wave functions of the remaining ions is taken into
account, it is reduced, in the case of the free motion of an electron, above

all to the inertialess polarization of the rotation, and leads to a reduction
of the level of the conductivity zone.
Next, the wave functions of the system of adiabatic approximation are defined
for any position of the anomalous node. For this purpose a variation prin-
ciple, the minimum condition of the averaged HAMILTONIAN, is used. Dipole-
dipole interaction of ions is taken into account. The determination of the
dipole moments of the ions is then discussed. In dipole approximation the
influence exercised by the position of the anomalous node on the shape of
the Ψ functions of the remaining ions is taken into account. In conclusion
the determination of the potential and of the kinetic energy of the surplus
charge and the determination of the selfconsisting state of the electron
(or hole) is dealt with.
The method suggested here is also suited for the computation of the hole
states with small radius, for which there has hitherto been no theory at all.

INSTITUTION: State University Kiev
             Pedagogic Institute Zitomir

KUCHER, T. I.

USSR/Electricity - Dielectrics   G-2

Abs Jour   : Ref Zhur - Fizika, No 1, 1958, 1228

Author   : Kucher, I.Y.

Inst   : Zhitomir Pedagogical Institute

Title   : Thermal Equilibrium of Electrons in a Colored Ionic
             Crystal.

Orig Pub   : Nauk. zap. Zhitomirs'k. derzh. ped. in-t, ser. fiz.-matem.
             1957, 3, 97-105

Abstract   : A statistical method is used to find the concentration of
             the current carriers (polarons) and the filling of the lo-
             cal levels (F and F' centers) in alkali-halide crystals
             as a function of the temperature. Curves for the dependen-
             ce of the number of free polarons on the temperature are
             found to have a characteristic break.

Card 1/1

KUCHER T.I.

AUTHOR: KUČER, T.I.
TITLE: The Heat Content of KCl. (Russian)

ABSTRACT: The author computed the heat content of a KCl crystal for
            16 temperatures in the interval of from $T = 10,89°$ to
            $T = 267,6°$. For the determination of the heat content the
            values of the eigenfrequencies of KCl (which have been com-
            puted in one of the author's previous works as well as by other
            authors in consideration of the deformation of the ions of the
            lattice) and also the differences of the masses of the ions
            of K and Cl were used. The deformation of ions was taken into
            account in accordance with the method developed by TOLPYGO.
            Computation results are shown in form of a diagram. The same
            diagram contains such heat contents as were determined from
            DEBYE'S temperatures by assuming a model with point lattice
            and equal masses of K- and Cl ions. As may be seen from the
            diagram, it is not by any means possible to declare that the
            above offers any advantage over the results obtained by
            M.IONA, Phys.Rev. 69,822 (1941). This is due to the fact that

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The Heat Content of KCl. (Russian)   PA - 2034

heat content, as an integral quantity, depends only little on
the computation method. The fact that a somewhat increased
heat content is obtained at low temperatures points towards an
increased value of the parameters a_{11} and a_{22} of the non-

electrostatic forces of the interaction between KCl ions and
in a work by TOLPYGO.

ASSOCIATION: Pedagogic Institute ZITOMIR
PRESENTED BY:
SUBMITTED:
AVAILABLE: Library of Congress

Card 2/2

AUTHOR:	KUCHER, T.I. PA - 2961
TITLE:	Proper Frequencies and Amplitudes of Free Normal Oscillations in KCl Crystals. (Sobstvennyye chastoty i amplitudy scobodnykh normal'nych kolebaniy kristalla KCl, Russian)
PERIODICAL:	Zhurnal Eksperim. i Teoret.Fiziki, 1957, Vol 32, Nr 3, pp 498-505 (U.S.S.R.)
	Received: 6 / 1957 Reviewed: 7 / 1957

ABSTRACT: The eigenfrequencies of ions and the amplitudes of their normal oscillations are computed for values of the wave number vector K which covers the cell of the reciprocal lattice uniformly at 729 points, and by taking account of the polarization deformation of the electron shells according to the method by K.B.TOLPYGO (Zhurnal Eksperim. i Teoret.Fiziki, 497, 1950); they are then compared with the results obtained by other authors, especially by M.IONA (Phys.Rev.60, 822). (1 Table, 9 Citations from Published Works.)

ASSOCIATION: Pedagogical Institute "ZHITOMIR"
PRESENTED BY:
SUBMITTED: 24.12. 1957
AVAILABLE: Library of Congress

Card 1/1

KUCHER, T. I., Cand Phys-Math Sci -- (diss) "Theory of
                                              and
zonal ₴₴₴₴ and local states of electrons ₍ₓ₎ꭵ holes in hetero-

polar crystals." Kiev, 1958. Cover, [4] pp (Acad Sci Ukr SSR,

Inst of Physics), 150 copies. Bibliography at end of text

(13 titles) (KL, 35-58, 105)

AUTHOR: Kucher, T. I.   56-2-18/51

TITLE: The Hole Zones in Crystals With NaCl-Type Lattice (Dyrochnyye zony v kristallakh s reshetkoy tipa NaCl)

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1958, Vol 34, Nr 2, pp 394-404 (USSR)

ABSTRACT: This work examines the energy and the state function of a cubic crystal of the NaCl-type without an electron (hole) in the multiple electron approximation by Fock on the assumption of strong coupling. The first paragraph deals with the set up of the problem and with most important assumptions. Let the hole be localized near the halogen centers. The Hamiltonian of the system is assumed to consist of the sum of the Hamiltonians of the separate ions and of the Hamiltonians of interaction of the various ions. The energy of the hole depends on the exchange integrals of the neighboring halogen ions. In the computation of the energy of the hole the exchange of the electrons of the valence p-shell with the inner electrons is neglected; i.e. only 6 (or 5) outer electrons at an atomic number $Z = 5$ are examined. The wave functions of the atom and of the ion are, according to Fock (reference 4), chosen for atoms with

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The Hole Zones in Crystals With NaCl-Type Lattice   56-2-18/51

several electrons. The radial part of this wave function de-
pends on the crystal and in first approximation on the halo-
gen. Further assumptions are given. In the atom one electron
of the p-shell is missing and therefore its electron functions
are triple degenerate and a linear combination of them must be
used. The total spin of the crystal is invariable. The wave
function holding under these circumstances is given. The until
now unknown coefficients of the linear combination, whcih are
contained in this wave function, satisfy a normalisation con-
dition and are ascertained fro, a minimum condition for the
total energy of the system. The second paragraph computes the
total energy and the exchange integrals and the third para-
graph computes the above mentioned coefficients. 3 hole zones
are obtained which in general are not identical with each oth-
er. In the general case the energy is expressed by the ex-
change integrals D and E. A diagram illustrates those curves,
which describe the qualitative behaviour of the energy for all
3 branches. The minimum of energy corresponds to the periphery
of the Brillouin (Brillyuen) zone. The last paragraph deals
with the effective mass in the hole zone. The energy is deve-
loped into a power series near the steady point and near the

Card 2/3   minima . The area of constant energy is an ellipsoid of revo-

The Hole Zones in Crystals With NaCl-Type Lattice   56-2-18/51

lution, which is flattened along the axis of rotation x. The
effective mass is a tensor and is here written down for the
case of KCl. This work gives a relatively simple method for
the computation of the hole zones of all halogen-containing
crystals and also of other crystals (f.i. of oxides) with a
NaCl-type lattice. The author in the future wants to compute
the zones for LiCl, NaCl, RbCl, and AgCl and for the fluorides.
There are 2 figures, 4 tables, and 10 references, 7 of which
are Slavic.

ASSOCIATION: Zhitomir Pedagogical Institute (Zhitomirskiy pedagogicheskiy
                 institut)

SUBMITTED: July 11, 1957

AVAILABLE: Library of Congress

                 1. Crystals-Energy-Function   2. Mathematical analysis

Card 3/3

24(3)
AUTHOR: Kucher, T. I.

TITLE: The Hole-Zones in NaCl (Dyrochnyye zony v NaCl)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958,
             Vol 35, Nr 4, pp 1049-1050 (USSR)

SOV/56-35-4-42/52

ABSTRACT: The author calculated (Ref 1) in a general manner the hole
             zones and the effective masses for crystals of the type NaCl.
             The many-electron problem was solved here by the method de-
             veloped by Hartree (Khartri)-Fok in strong coupling approxi-
             mation. In the earlier paper mentioned formulae were derived,
             which express the energy $E(\vec{k})$, the breadth of the actual zone
             (aktual'naya zona), the effective masses, etc., by two ex-
             change integrals D and $\mathcal{E}$. The latter were calculated in the
             aforementioned earlier paper only for KCl   . The present
             paper deals in short with the analogous calculations for NaCl.
             An expression for the energy $E(\vec{k})$ as a function of the wave
             number $\vec{k}$ is written down and explained in short. In this way
             the following was found: The breadth of the actual zone

Card 1/2 $(2e^2/d)\ 4(2\mathcal{E} - D) = 2.17$ eV; the tensor of the effective

The Hole-Zones in NaCl   SOV/56-35-4-42/52

masses at the actual point (aktual'naya tochka) $\{\pi/d;\ \pi/d;\ \pi/d\}$: a) parallel to the diagonal of the cube [111] - the longitudinal mass $\mu = \mu_{min} = 6.38 \cdot 10^{-2}/(2\mathcal{E} - D) = 0.539$,

b) vertical to the diagonal of the cube - the transversal mass $\mu = \mu_{max} = 6.38 \cdot 2 \cdot 10^{-2}/(4\mathcal{E} + D) = 0.98$. A certain broadening of the actual hole zone in NaCl (compared to KCl) is due to the smaller lattice constant of NaCl. This causes an exponential increase of the exchange integral. The author thanks V. I. Fedorchenko for checking part of the calculations. There are 4 references, 1 of which is Soviet.

ASSOCIATION: Institut fiziki Akademii nauk Ukrainskoy SSR
             (Physics Institute of the Academy of Sciences UkrSSR)

SUBMITTED: June 23, 1958

Card 2/2

KUCHER, T.I.

Theory of F-hole centers in alkali halide crystals. Ukr. fiz. zhur.
4 no.3:345-356 My-Je '59. (MIRA 13:2)

1.Institut fiziki AN USSR.
(Alkali halide crystals)

85155
S/181/60/002/009/046/047/XX
B004/B070

24.7700 (1043, 1143, 1144)

AUTHORS: Kucher, T. I. and Tolpygo, K. B.

TITLE: The Structure of Hole Bands of the Alkali-Chloride

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 9, pp. 2301-2309

TEXT: In a previous paper by the same authors (Ref. 1) on the many-electron theory of the local states of electrons and holes, there occurred an error in the sign of the matrix elements Hll'. This has affected the results of the band states of holes in KCl (Ref. 2) and NaCl (Ref. 3). The present paper aims at correcting the error and summarizing the results obtained for KCl, NaCl, RbCl, and LiCl (for LiCl according to the data of L. I. Branda, Ref. 4). A formula for the dependence of the crystal energy $\overline{H}_k$ on the wave vector $\vec{k}$ is derived. The wave function $\overline{H}_k(\kappa)$ for three directions of the wave vector is shown in Figs. 1-3. Fig. 4 shows the exchange integrals E and D and the width E of the hole band as functions of the lattice constant a = d/2. The principal values of the tensor $\mu(a)$ and the effective masses of the holes at the point $k(\kappa, \kappa, 0)$

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The Structure of Hole Bands of the
Alkali-Chloride

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are given as functions of the lattice constants and compared with the data
of L. P. Howland (Ref. 5) in Fig. 5. Table 1 gives the properties of
the hole bands in their dependence on the lattice constant; Table 2 gives
the values of the constants $B = E_M + E_1 + E_2$ and $\overline{H}_{k\ min} = B + (\overline{H}_{k} - B)$
for RbCl, KCl, NaCl, and LiCl. The experimental values of the width ΔE
of the forbidden band are compared with the calculated values in Table 3.
A comparison between the results of the present paper and those of
Howland shows that it is not enough to regard the holes as being present
only in the outer shell of the ions. The $3p$ states of Cl^- and K^+ must also
be considered. If $\overline{H}_{k\ min}$ lies in the neighborhood of the origin of the
coordinate system $\vec{k} = 0$, the spin-orbit interaction, which has not been
taken into consideration for alkali-chloride so far, has a considerable
effect. Professor S. I. Pekar is thanked for discussions. There are 5
figures, 3 tables, and 18 references: 8 Soviet, 6 US, 2 British, and 2
Dutch.

ASSOCIATION: Institut fiziki AN USSR, Kiyev (Institute of Physics of
the AS UkrSSR, Kiyev)

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85155

The Structure of Hole Bands of the
Alkali-Chloride

S/181/60/002/009/046/047/XX
B004/B070

SUBMITTED: March 1, 1960

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20132

3/181/61/003/002/030/050
B102/B212

9,4300 (and 1035 1143)

AUTHOR: Kucher, T. I.

TITLE: The problem of diffusion in an evaporating solid medium

PERIODICAL: Fizika tverdogo tela, v. 3, no. 2, 1961, 547-552

TEXT: It has been established experimentally that during diffusion of
impurities from the gas phase into germanium or silicon at temperatures
near their melting temperatures these crystals will evaporate very rapid-
ly. The evaporation rate is of the same order as the diffusion rate. So
far, these processes have been studied theoretically but not solved
exactly. The aim of this paper is to show such an exact solution.
The investigation has been based on a model shown in Fig. 1: The diffu-
sion (diffusion coefficient D) into the semi-infinite homogeneous solid
II shall take place from a gas phase I having a constant concentration;
a constant concentration C_0 with respect to time shall be in the interface,
but this surface shall be subjected to a translation having a velocity v.
The concentration distribution $C(x,t)$ of the diffusing material in the

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The problem of diffusion....

solid has to be found. x denotes the distance from the initial position of the interface. $C(x,t)$ is obtained as solution of the Fick equation $D\partial^2 C/\partial x^2 = \partial C/\partial t$, where $C(x,0) = 0$ for all $x > 0$ is its initial condition and $C(vt,t) = C_0$ for any t its boundary condition. The following solution is obtained after extensive calculations:

$$C(x',t) \equiv C(x-vt,t) = \frac{C_0}{2}\left\{ \operatorname{erfc}\left[\frac{x'+vt}{2\sqrt{Dt}}\right] + e^{-vx'/D}\operatorname{erfc}\left(\frac{x'-vt}{2\sqrt{Dt}}\right)\right\} \quad (13),$$

χ

where $\operatorname{erfc}\, x = 1 - \operatorname{erf}\, x = 1 - \frac{2}{\sqrt{\pi}}\int_0^x e^{-y^2}\, dy$ has been tabulated. It turns

out to be very difficult to determine the initial concentration C_0 experimentally. Here, C_0 has not been defined as a concentration on the sample surface, but as the concentration of an infinitely small coat on the surface. Therefore, C_0 differs from the solubility because above $x' = 0$ it is a function of the partial pressure of the diffusing substance. The difficulties which arise when determining C_0 can be avoided as follows:

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The problem of diffusion...

(13) represents an exact solution and it contains C_o and D as unknown quantities, in principle two measurements are sufficient to determine them. Since (13) cannot be solved for D, the following approximate formulas are suggested to determine D and C_o. For $x' \ll vt$ is:

$c(x',t) \simeq C_o \exp(-vx'/D)$ and for $x' > vt + 2\sqrt{Dt}$ is

$$\frac{C}{C_o} \simeq \sqrt{\frac{4Dt}{\pi}} \ \frac{x'}{x'^2 - v^2 t^2} \ \exp\left[-(x'+vt)^2/4Dt\right] \quad \text{and}$$

$$D = \frac{0.1086(x'_2 - x'_1)(x'_1 + x'_2 + 2vt)}{t \log\left[C_1 x'_2(x'^2_1 - v^2 t^2)/C_2 x'_1(x'^2_2 - v^2 t^2)\right]}$$

A comparison of the numerical values of V. D. Ignatkov and V. Ye. Kosenko (Diffusion of tellurium into germanium) shows that these approximate assumptions agree well with experimental data. For practical purposes

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The problem of diffusion...

S/181/61/003/002/030/050
B102/B212

the variables $z = x'/2\sqrt{Dt}$ and $a = (v/2)\sqrt{t/D}$ are introduced, with

$$y(a,z) = \frac{C(a,z)}{C_0} = \frac{1}{2}\left\{\text{erfc}(z+a) + e^{-4az}\text{erfc}(z-a)\right\} \text{ and for } \log y = f(\log z)$$

the family of curves shown in Fig. 2 is obtained. $a_i = 0.01, 0.1, 0.5,$
1, 2, 3, 5, 10; $i = 1 - 8$. Relation $D = v^2 t/2a$ can be used to determine
D. Fig. 3 shows the family of curves which is obtained for log y

$= f(\log \frac{x'v}{D})$ and various values of $\alpha_i \equiv vt/x_i'$ (here $a = vt/3$);
$\alpha_i = 0.08, 0.09, 0.1, 0.14, 0.2, 0.3, 0.4, 0.6, 1$ and $\infty (i = 1 - 10)$.
The sections of the abscissa in Fig. 3 represent the values of log (v/D),
those in Fig. 2 represent log (4Dt)/2 and its sections on the ordinate
log C_0. There are 3 figures and 3 references: 2 Soviet-bloc and
1 non-Soviet-bloc.

ASSOCIATION: Institute fiziki AN USSR Kiyev (Institute of Physics
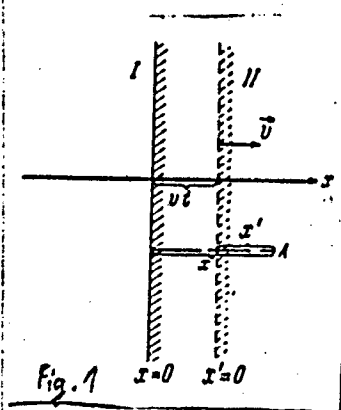   AS UkrSSR, Kiyev)

Card 4/6

20132

The problem of diffusion...

S/181/61/003/002/030/050
B102/B212
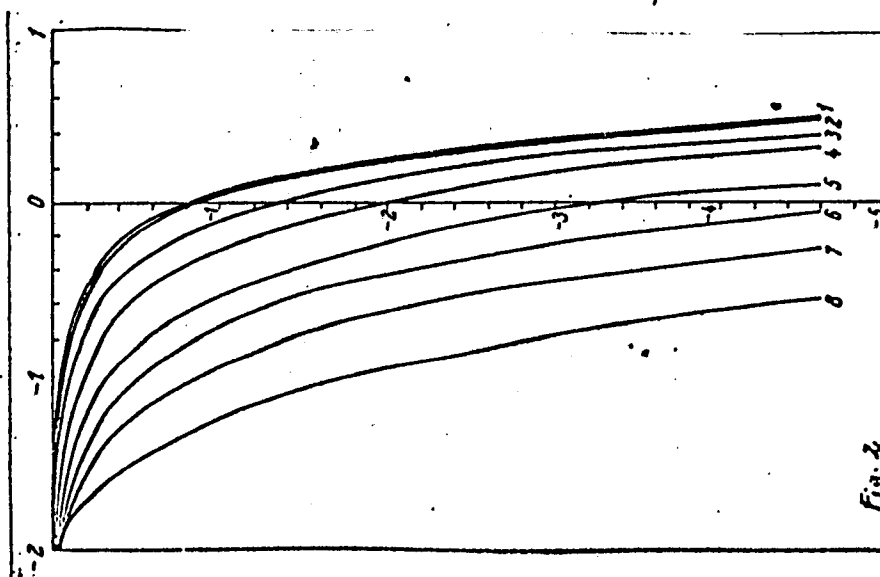
SUBMITTED: June 13, 1960

Fig. 1 $x=0$ $x'=0$

FIG. 3
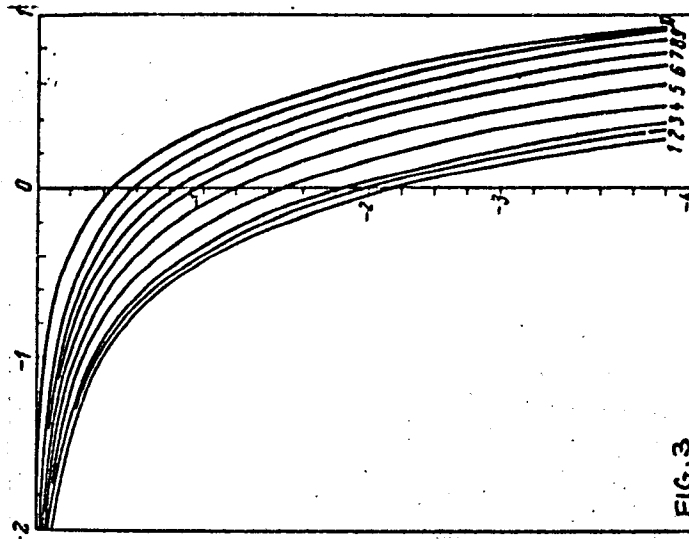
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The problem of diffusion...

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Fig. 2

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27300

S/181/61/003/008/030/034
B111/B102

24.7500

AUTHORS: Demidenko, Z. A., Kucher, T. I., and Tolpygo, K. B.

TITLE: Eigenfrequencies of lattice vibrations of germanium as
                calculated in various approximations

PERIODICAL: Fizika tverdogo tela, v. 3, no. 8, 1961, 2482 - 2494

TEXT: A study is made of the natural vibrations of the germanium lattice,
taking account of the dipole moments $\overline{\mathcal{P}}_s^1$ of electron shells, that appear
with a displacement of nuclei. Expressions from Ref. 8(V. S. Mashkevich,
K. B. Tolpygo, ZhETF, 32, 520, 1957) and Ref. 12 (FTT, III, no. 3, 1961)
are used for the potential energy U of the crystal. Taking account of
either short-range forces (zeroth approximation) or the sole linear terms
in dipole exchange interaction (first approximation) is insufficient.
Calculations are performed in various types of first and second approxima-
tions. Experimental data, however, do not allow to prefer one of these
variants. It is stated that the third approximation (i. e., taking also
nonelectric interactions into account fits reality better than the model

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27300

Eigenfrequencies of lattice...

S/181/61/003/008/030/034
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W. Cochran. The present paper is based upon results of Ref. 12 (K. B. Tolpygo, FTT, III, no. 3, 1961), and its aim is to explain the nature of interatomic forces, and, by comparison between theory and experiments, to calculate all parameters. The natural vibrations of a diamond-type lattice are calculated in various approximations in the first part of the present paper, and formulas are derived for the moduli of elasticity and for the limiting frequencies of optical vibrations. A comparison of results with data obtained from the Raman effect shows that the first approximation is not sufficient to describe the vibrational spectrum in the case of large dipole moments. The matrices of the inner field and the eigenfrequencies are calculated in first approximation in the second part of the paper. By taking account of a possible nonelectric interaction, an attempt is made to improve results of earlier investigations (UFZh I, 226, 1956; ZhETF, 32, 498, 1957; FTT, II, 2655, 1960). A critical study showed that the dipole moments are not small, and that the electron-shell deformation and the interatomic electrostatic forces play an essential part in lattice dynamics. In the third part, the parameters of the equations describing harmonic lattice vibrations are determined, and eigenfrequencies are calculated in second approximation. There are 2 figures, 5 tables, 6 Soviet-bloc and
Card 2/3

27300

Eigenfrequencies of lattice...   S/181/61/003/008/030/034
                                                  B111/B102

12 non-Soviet-bloc references. The most important reference to English-
language publications reads as follows: W. Cochran, Phys. Rev. Lett., 2,
495, 1955; Proc. Roy. Soc., A 253, 260, 1959)

ASSOCIATION: Institut poluprovodnikov AN USSR, Kiyev (Institute of Semi-
                conductors AS UkrSSR, Kiyev)

SUBMITTED: December 22, 1960 (initially)
                April 24, 1961 (after revision)

Card 3/3

33349
S/181/62/004/001/018/052
B-08/B-04

24.7000 (1143, 1144, 1385)

AUTHORS: Demidenko, Z. A., Kucher, T. I., and Tolpygo, K. B.

TITLE: Frequencies and amplitudes of atomic vibrations in crystals with diamond lattice for a wave vector directed along the cube face diagonals

PERIODICAL: Fizika tverdogo tela, v. 4, no. 1, 1962, 104 - 109

TEXT: On the basis of previous papers (K. B. Tolpygo. FTT, 3, 943, 1961; Z. A. Demidenko et al. FTT, 3, 2482, 1961), the authors calculated the natural frequencies in germanium for the wave vector $\vec{k}$ pointing in the (1; 1; 0) direction. The six dispersion curves, $\omega(\vec{k})$, calculated in four different approximations are somewhat different from one another. The vibrations corresponding to branches 3 and 6 are entirely transverse (TO and TA). The other vibrations are mixed and have a purely longitudinal or transverse character only when $\vec{k} \longrightarrow \{0; 0; 0\}$ or $\{T; T; 0\}$ (Table 1). There are 1 figure, 3 tables, and 9 references: 4 Soviet and 5 non-Soviet. The four most recent references to English-language publications read as follows: B. N. Brokhouse a. P. K. Iyengar. Phys. Rev., 111, 747, 1958;

Card 1/2

Frequencies and amplitudes...

33349
S/181/62/004/001/018/052
B108/B104

W. Chochran. Phys. Rev. Lett., 2, 495, 1959; Chose et al. Phys. Rev., 113, 49, 1959; Pros. Roy. Soc., A253, 260, 1959; Lett., 2, 256, 1959.   B. N. Brokhouse Phys. Rev

ASSOCIATION: Institut poluprovodnikov AN USSR Kiyev (Institute of Semiconductors AS UkrSSR, Kiyev)

SUBMITTED: July 12, 1961

Table 1.   Components of $\vec{P}_1$ and $\vec{P}_2$. Legend: (A) branch no; (LO, longitudinal optical vibrations; (TO) transverse optical vibrations; (TA) transverse acoustic vibrations; (LA) longitudinal acoustic vibrations.

Card 2/2

31.7500

S/181/62/004/004/023/042
B102/B104

AUTHOR: Kucher, T. I.

TITLE: Natural vibration frequencies of silicon and diamond

PERIODICAL: Fizika tverdogo tela, v. 4, no. 4, 1962, 992-998

TEXT: Z. A. Demidenko, T. I. Kucher, and K. B. Tolpygo have developed a
method of calculating the natural frequencies of diamond-type crystals
(FTT, 3, 2482, 1961; 4, 104, 1962), which had been used for determining
the frequency spectrum of germanium in the three symmetry directions of
the K-space. This method has now been used to calculate the vibration
frequencies of a Si crystal. The particularities of the diamond
frequencies are discussed and the results are compared with experimental
ones (B. N. Brockhouse. Phys. Rev. Lett., 2, 256, 1959) and with earlier
calculations (H. Smith. Phil. Trans. Roy. Soc. of London, A241, 105, 1948;
F. Herman. J. Phys. Chem. Sol. 8, 405, 1959; H. Cole. E. Kineke. Phys.
Rev. Lett. 1, 360, 1958). In this theory the electron shell deformation
is described by the atomic (or ionic) dipole moments; the potential energy
of the lattice comprises the Coulomb interaction of all dipole moments,

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S/181/62/004/004/023/042
B102/B104

Natural vibration frequencies...

their self-energies and the short-range interaction between displacements and dipole moments of the nearest neighbors. The zeroth order of the theory describes a point lattice, and e.g. the third approximation covers the interactions with the second coordination sphere. For homopolar crystals all interactions are assumed to take place in an axisymmetric field the axis being a straight line connecting the interacting atoms. So the parameters of any approximation are the elastic interaction constants of relative displacements perpendicular $(H, h, \mathcal{H})$ or parallel $(G, g, \mathcal{G})$ to this axis. $G > g > \mathcal{G}$, $H > |h| > \mathcal{H}$. The elastic forces in transverse displacement are always weaker than in longitudinal. In the third approximation two new parameters arise (F and $\mathcal{E}$) with $G = g_c - \frac{1}{2}(F + \mathcal{E})$; $H = H_0 + 2\mathcal{E} - 4\mathcal{E}$. Finally the atomic (ionic) polarizability, A_i, belongs to the 7 (second approximation) or 9 (third approximation) characteristic parameters. Five of them can be determined from the elastic constants, the refractive index, and the limit of optical frequencies when $\vec{x} \to 0$. For C, Si, and Ge all these parameters are calculated (Table 2) when setting $F = 0$; $F \neq \mathcal{E}$ yields quite as good results. These data are used

Card 2/3

Natural vibration frequencies...

S/181/62/004/004/023/042
B102/B104

to calculate the dispersion curves $v(\vec{k})$ for the $\vec{k}$ directions (100), (011), (111) for Si and C. The results, which are of great value for further experimental studies, are compared with those of other papers (different approximations). There are 2 figures and 3 tables.

ASSOCIATION: Institut poluprovodnikov AN USSR, Kiyev (Institute of Semiconductors AS UkrSSR, Kiyev)

SUBMITTED: December 11, 1961

Кристалл	G	H					$\frac{1}{A}$		F
C	21.543	−3.876	5.000	−1.870	+0.8536	−0.9723	7.633	0.36	0
Si	23.498	−3.4186	4.065	−1.4746	+0.9154	−0.0768	6.310	0.25	0
Ge	22.423	−3.048	3.495	−1.195	+0.960	−0.948	5.9862	0.20	0

Card 3/3

Table 2

S/181/62/004/009/010/045
B108/B186

AUTHOR: Kucher, T. I.

TITLE: About the similitude of the natural frequency dispersion curves
            of diamond type crystals

PERIODICAL: Fizika tverdogo tela, v. 4, no. 9, 1962, 2385 - 2392

TEXT: The frequency $\nu(\vec{k})$ of natural vibrations performed by crystals of the
diamond type (diamond, silicon, germanium and grey tin) is shown to have
the same dispersion for all these crystals on the basis of data in various
publications (Z. A. Demidenko et al., FTT, 3, 2484, 1961; 4, 104, 1962; K.
B. Tolpygo. FTT, 2, 2655, 1960). Experimentally this is proved by estab-
lishing the correlation between the Debye temperatures and the dispersion
curves of grey tin. Assuming it, the following empirical formula for the
Debye temperature θ of diamond type crystals is established:

$$\theta(^0K) = \frac{c\sqrt{3}}{\sqrt[3]{\mu\cdot d}} 10^{-3}(2.9\cdot10^{-7} - 2d)$$ where $d = 2a$ is the lattice constant, μ

is the reduced mass of the atoms in the unit cell. The specific heats of
the diamond-type crystals also have equal dependences on temperature. Thero
are 5 figures and 4 tables. The most important English-language references
Card 1/2

About the si ilitude ...   S/181/62/004/009/010/045
                                                B108/B186

are: m. J. McShimin. J. Appl. Phys., 24, 988, 1953; S. Bhagavantam, J.
Bhimasenachar. Proc. Roy. Soc. (London), A187, 331, 1946; H. J. McSkimin,
W. L. Bonl. Phys. Rev., 105, 116, 1957.

ASSOCIATION: Institut poluprovodnikov AN USSR Kiyev (Institute of Semi-
               conductors AS UkrSSR, Kiyev).

SUBMITTED: April 5, 1962

Card 2/2

S/185/62/007/012/021/021
D234/D308

AUTHOR: Kucher, T.Y.

TITLE: Second symposium concerned with new
               problems of semiconductor physics

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 7,
               no. 12, 1962, 1369 - 1370

TEXT: The symposium, held on June 8 - 9, 1962
in Kiev, was presided over by V. Ye. Lashkar'ov, member of the
AS UkrSSR and organized by Naukova Rada z napivprovidnykiv ta
elektroniky   (Scientific Council for Semiconductors and Elec-
tronics) and Instytut napivprovidnykiv AN URSR   (Institute
of Semiconductors of the AS UkrSSR). The papers read were:
E.Y. Rashba   (Institute of Semiconductors of the AS UkrSSR),
'Resonance phenomena in zone carriers in crystals', H. Ye.
Pikus   (Leningrad), 'Effect of deformation on properties of
crystals',   L.V. Keldysh   (FIAN, Moscow), 'Tunnel phenomena
in solids', L.S. Palanyk of the Kharkivs'kyy politekhnichnyy

Card 1/2

Second symposium ...   S/185/62/007/012/021/021
                              D234/D308

instytut (Kharkov Polytechnic Institute), 'Mechanism of
formation, structure (substructure) and physical properties
of condensed films', V.M. Buymistrov, 'Survey of deep traps
and recombination'.

Card 2/2

ACCESSION NR: AP4019842   s/0181/64/006/003/0801/0810

AUTHOR: Kucher, T. I,

TITLE: Diffusion from the vapor phase into a crystal in light of the two possible
mechanisms of diffusion and the exchange between them

SOURCE: Fizika tverdogo tela, v. 6, no. 3, 1964, 801-810

TOPIC TAGS: impurity diffusion, ideal crystal, diffusion coefficient, crystal
lattice defect, Frenkel defect

ABSTRACT: The author has examined the diffusion of impurities from vapor into
semi-infinite crystals in which the impurities may be diffused by two methods:
through lattice sites and through interstices, with different coefficients of
diffusion (D_s and D_i) and different equilibrium solubilities (c_s^0 and c_i^0). On the
assumption of a constant number of vacancies, the problem may be solved accurately.
This constancy may be attained if the concentration of impurities is much smaller
than the concentration of vacancies and if diffusion practically fails to disturb
the thermodynamic equilibrium in the lattice, or it may be attained if the rate of

Card 1/3

ACCESSION NR: AP4019842

restoring this thermodynamic equilibrium exceeds the rate of diffusion because of
rapid formation of Frenkel defects. Consideration of the kinetics of vacancy
formation, even in ideal (dislocation-free) crystals, leads to a system of non-
linear equations. Under ordinary conditions of a large difference in diffusion
coefficients $(D_s \ll D_i)$ and, correspondingly, in solubilities $(c_s^0 \gg c_i^0)$, a clear
expression may be found for concentration in the sample. For small intervals of
time, the summed process takes place as two independent processes with their own
parameters. For large time intervals, it takes place as a single slow diffusion
with the coefficient $D = D_s + \dfrac{c_i^0}{c_s^0} D_i$ and a limiting solubility $c^0 = c_i^0 + c_s^0$. "In

conclusion, the author wishes to express his thanks to Academicians V. Ye. Lashkarev
and S. I. Pekar of the AN UkrSSR and to K. B. Tolpy*go for their interest in the
work and for their valuable remarks." Orig. art. has: 1 figure and 32 formulas.

ASSOCIATION: Institut poluprovodnikov AN UkrSSR, Kiyev (Institute of Semiconductors

Card 2/3

KUCHER, V., laureat Stalinskoy premii.

Impressions from Vienna. Mast.ugl. 3 no.2:29-30 F '54. (MLRA 7:3)

1. Mashinist kombayna shakhty No.3-bis kombinata Stalinugol'.
            (Miners) (Labor and laboring classes)

KUCHER, V., inzh.

The OP-5 portable fire extinguisher. Pozh. delo 5 no.6:29-31
Je '59.   (MIRA 12:8)

(Fire sprinklers)

KUCHER, Vasyl'

KUCHER, Vasyl' The construction of rural electric power-plants in Vinnitsa District.
    Kyiv, derzh, vyd-vo khudozh, lit-ry, 1947. 98 p. map. (48-24667)

    TK1193.U3K82   PU

KUCHER, V.A., insh.; MERLINSKIY, M.M., insh.

Speeded up transportation of local freight on railroads. Zhel. dor.
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                    (Railroads--Freight)   (MIRA 11:10)

LIPSKIY, Vladimir Nikolayevich [Lips'kyi, V.M.]; PELIKH, D.L.
[Pelykh, D.L.], kand. sel'khoz. nauk, otv. red.; VELIKOKHAT'KO,
O.T.[Velykokhat'ko, O.T.], red.; KUCHER, V.I., red.; LIBERMAN,
T.R., tekhn. red.

[Development and distribution of the sugar industry in the
Ukrainian S.S.R.]Rozvytok i rozmishennia tsukrovoho vyrobnytstva
Uktains'koi RSR. Kyiv, Vyd-vo Akad. nauk URSR, 1962. 121 p.
                                                    (MIRA 16:3)

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graphic position. Trudy Inst. geol. nauk AN URSR. Ser. petr.,
min. i geokhim. no.16:22-33 '62.   (MIRA 15:10)

(Krivoy Rog Basin—Gneiss)

SOKHAN', Lidiya Vasil'yevna; SIL'CHENKO, Zinaida Aleksandrovna
        [Sil'chenko, Z.O.]; OSTRYANIN, D.Kh.[Ostrianyn, D.Kh.],
        otv. red.; KUCHER, Y.L., red.; MATVIICHUK, O.O., tekhn.red.

        [Technological progress and the worker; the formation of a
        new type of worker in the process of the building of com-
        munism] Tekhnichnyi progres i robitnyk; formuvannia pratsiv-
        nyka novoho typu v protsesi komunistychnoho budivnytstva.
        Kyiv. Vyd-vo AN URSR, 1963. 161 p.   (MIRA 16:10)

        1. Chlen-korrespondent AN Ukr.SSR (for Ostryanin).
                        (Labor and laboring classes) (Communism)

DEPENCHUK, Nadezhda Pavlovna; PODGURSHNYY, I.I., kand. filos. nauk,
    otv. red.; KUCHER, V.I., red.; TURBANOVA, N.A., tekhn.red.

[Symmetry and asymmetry in living nature] Simmetriia i asim-
metriia v zhivoi prfrode. Kiev, Izd-vo AN USSR, 1963. 174 p.
                                              (MIRA 16:10)
              (SYMMETRY (BIOLOGY))

CHETOKALO, I.Z., akademik, red.; BOGOLYUBOV, N.N., akademik, red.;
GLUSHKOV, V.M., akademik, red.; AKHIYEZER, A.I., akademik,
red.; PARASYUK, O.S., akademik, red.; KOPNIN, I.V., doktor
filosofskikh nauk, red.; VIL'NITSKIY, M.U., kand. fil. nauk,
red.; DYSHLEVYY, P.S., kand. fil. nauk, red.; KUCHER, V.I.,
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[Philosophical questions of modern physics. materials] Fi-
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1. Respublikanskoye soveshchaniye po filosofskim voprosam
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Ukr.SSR (for Dyshlevyy, Kopnin).

increases proportiona

appreciation

BONDARENKO, P.M., inzhener-geolog; GOROSHNIKOV, B.I., kand.geologo-mineralo-
gicheskikh nauk; KULISHOV, M.P., kand.geologo-mineralogicheskikh
nauk; KUCHER, V.N., geolog

Relationship between the Krivoy Rog metamorphic series and Saksagan
plagioclastic granites. Sbor. nauch. trud. NIGRI no.2:132-142 '59.
(MIRA 14:1)

(Krivoy Rog Basin—Rocks, Crystalline and metamorphic)
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BELEVTSEV, Ya.N.; FOMENKO, V.Yu.; NOTAROV, V.D.; MOLYAVKO,G.I.;MEL'NIK,
Yu.P.; SIROSHTAN, R.I.; DOVGAN', M.N.; CHERNOVSKIY, M.I.;
SHCHERBAKOVA, K.F.; ZABORUYKO, L.G.;GOROSHNIKOV, B.I.;
AKIMENKO, N.M.; SEMERGEYEVA, Ye.A.; KUCHER, V.N.; TAKHTUYEV,
G.V.; KALYAYEV, G.I.; ZARUBA, V.M.; NAZAROV, P.P.; MAKSIMOVICH,
V.L.; STRUYEVA, G.M.; KARSHENBAUM, A.P.; SKARZHINSKAYA, T.A.;
CHEREDNICHENKO, A.I.; GERSHOYG, Yu.G.; PITADE, A.A.; RADUTSKAYA,
P.D.; ZHILKINSKIY, S.I.; KAZAK, V.M.; KACHAN, V.G.; STRYGIN,
A.I., red.; LADIYEVA, V.D., red.; ZHUKOV, G.V., red.; YEPATKO,
Yu.M., red.; SHCHERBAKOV, B.D., red.; SLENZAK, O.I., red.izd-va;
RAKHLINA, N.P., tekhn. red.

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Vol.1.[General problems in the geology of the Krivoy Rog Basin.
Geology and iron ores of the deposits of the "Ingulets,"
Rakhmanovo, and Il'ich Mines]Obshchie voprosy geologii Krivbassa.
Geologicheskoe stroenie i zheleznye rudy mestorozhdenii rudnikov
"Ingulets," Rakhmanovskogo i im. Il'icha.   1962.   479 p.
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                (Krivoy Rog Basin—Iron ores)

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M.I.; SHCHERBAKOVA, K.F.; ZAGORUYKO, L.G.; GOROSHNIKOV, B.I.;
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CHEREDNICHENKO, A.I.; GERSHOYG, Yu.G.; PITADE, A.A.; RADUTSKAYA,
P.D.; ZHILKINSKIY, S.I.; KAZAK, V.M.; KACHAN, V.G.; POLOVKO,N.I.,
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[Geology of the Krivoy Rog iron ore deposits] Geologiia Krivo-
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USSR. Vol.1.[General problems of the geology of the Krivoy Rog
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Lenin deposits]Geologicheskoe stroenie i zheleznye rudy mestorozhdenii
im. Derzhinskogo, im.Kirova, im.K.Linkenkhta, im.XX parts"ezda, im.
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AUK unit for rod bolting. Shakht. stroi. 7 no.4:15-16 Ap '63.
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